

**U.S. ARMY CORPS OF ENGINEERS (USACE) DOCUMENTATION
TO THE COUNCIL ON ENVIRONMENTAL QUALITY FOR THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)
REFERRAL OF THE MANTEO (SHALLOWBAG) BAY PROJECT,
DARE COUNTY, NORTH CAROLINA
NOVEMBER 2001**

EXECUTIVE SUMMARY

NOAA has referred the Manteo (Shallowbag) Bay project to the Council on Environmental Quality because it believes the project will have significant impacts on the environment, that the analyses performed to support the proposed project are inadequate, and that the FEIS Supplement III does not adequately discuss potential project impacts. The USACE believes that it has diligently followed the procedures established for Federal water resources planning under the Principles and Guidelines, and has correctly recommended the plan with the greatest net economic benefits consistent with protecting the environment. NOAA raises four principle issues as the basis of their referral. A summary of these issues and the USACE response are as follows.

***NOAA Issue:** NOAA is concerned that the proposed project may interfere with transport of larval fish and shellfish through the inlet. Significant reductions in successful larval transport would have significant long-term impacts on a resource of national significance. NOAA believes that the USACE position is based on only two studies and therefore does not believe that the USACE has performed an adequate evaluation of potential project impacts on this resource. It believes the FEIS is deficient to the point where its use for decision-making contravenes the purpose, requirements, and intent of NEPA.*

USACE Response: The FEIS Supplement III conclusion that construction of the jetties will not significantly impact larval transport is warranted by all available scientific information collected over many years. The USACE believes that the FEIS Supplement III adequately describes the reasonably foreseeable impacts of the construction of the jetties and serves as a proper decision-making tool for this project. The USACE conclusions are based on over two decades of coordination and analysis - far more than two studies cited by NOAA. The inclusion of a weir in the north jetty enhances the prospects for successful larval transport through the inlet.

***NOAA Issue:** NOAA believes that significant beach erosion may result from the proposed project. If such erosion occurs, significant impacts to aquatic resources and other productive habitats may occur. NOAA believes that the FEIS is deficient because it did not address the impacts of this potential erosion.*

USACE Response: An integral part of the proposal to construct the jetties is the execution of a sand management plan that would assure that the erosion and island overwash concerns expressed by NOAA would not be realized. Sand bypassing is

included as an authorized component of the project. USACE prepared a Feature Design Memorandum on Sand Bypassing (Management) dated July 1995. The results of this FDM are included in FEIS Supplement III. The FDM clearly establishes shoreline monitoring methodologies and erosion thresholds that will determine placement, frequency, and quantities of material to be bypassed.

***NOAA Issue:** NOAA believes that the existing mitigation plan is inadequate. It believes that there is no assurance that mitigation needs can or will be identified, or that the impacts of the project can be offset.*

USACE Response: The FEIS Supplement III is a product of extensive investigation, analysis and coordination over a period of many years. It has addressed in great detail the views and concerns on the other federal agencies and interested parties and has properly considered alternatives, environmental consequences and mitigation. USACE has proposed an adaptive monitoring plan that responds to resource concerns and is flexible enough to respond to changed conditions and resource interests. While the USACE has no direct control over Federal appropriations, historically, we have been faithful in acquiring funds to maintain, manage, and mitigate at Federal water resource projects.

***NOAA Issue:** NOAA believes that the USACE did not perform a fair or objective evaluation of the No Action Alternative. It believes that the No Action Alternative may have a better benefit to cost ratio and less environmental impact and therefore deserves more detailed evaluation. It believes that the USACE alternatives evaluation is inadequate and violates CEQ regulations.*

USACE Response: Consideration of the impacts of alternatives on fish and wildlife has been central to the planning of this project and significant modifications are proposed that are intended to diminish or eliminate the environmental impacts of the project. USACE believes the proposed project avoids or appropriately mitigates for environmental damage that might arise from its construction, while providing a safe and reliable channel for navigation projects. The no action plan is thoroughly addressed in the GDM and FEIS Supplement III. It has a marginal level of success, providing authorized dimensions of 14' X 400' only about 25 % of the time. Even with almost continuous dredging, hazardous navigation conditions frequently exist in the inlet, resulting in vessel losses and damages, vessel relocations and delays, injuries to crews and occasional deaths.

The USACE believes the weight of the evidence demonstrates that it has correctly identified the NED plan, has fairly analyzed reasonably foreseeable impacts to the environment, presented those anticipated impacts and opposing views in an unbiased manner, and has given full consideration to every reasonable alternative. A full presentation of NOAA's issues and the USACE responses are provided in the text that follows. The USACE is willing to provide any additional information desired by CEQ for use during its deliberations.

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INTRODUCTION

The Manteo (Shallowbag) Bay project is a product of extensive investigation, analysis and coordination for over 30 years. In the process of developing the plan, USACE has addressed, in great detail, the views and concerns on the other federal agencies and interested parties and has properly considered alternatives, environmental consequences and mitigation. Following the Federal planning guidelines, Principles and Guidelines (P&G), consideration of project impacts on fish and wildlife has been central to the planning of this project and significant modifications are proposed that are intended to diminish or eliminate the environmental impacts of the project. USACE believes the proposed project avoids or appropriately mitigates for environmental damage that might arise from its construction, while providing a safe and reliable channel for navigation projects. The project, as planned, satisfies Federal guidelines to develop a plan that contributes to national economic development consistent with protecting the Nation's environment. It is fully supported by the State of North Carolina, which is the project sponsor.

The following documentation is being provided in response to the referral package on the Manteo (Shallowbag) Bay project, Dare County, North Carolina, provided to the Council on Environmental Quality (CEQ) by the National Oceanic and Atmospheric Administration (NOAA), dated October 16, 2001. This information fully addresses the referral issues elevated by NOAA and is provided in the same format as the referral package.

BACKGROUND

Generally, the factual information presented by NOAA in their Background section is correct; however, there are a few areas of discrepancy. The description of the existing Manteo (Shallowbag) Bay project and the recommended alternative both use incorrect channel dimensions. For clarification, a description of the existing project and the authorized improvements are as follows.

Existing Project. The existing Manteo (Shallowbag) Bay project was authorized on May 17, 1950 (HD 310/81/1). That authorization provided for a 14' x 400' channel through Oregon Inlet; a 12' x 100' channel via Old House Channel to Pamlico Sound; a 12' x 100' channel from Oregon Inlet to a basin, 200' x 600' at Manteo; and a 12' x 100'

channel from the Manteo-Oregon Inlet channel to a basin 200' square at Wanchese. The project vicinity and the existing project can be seen on Figures 1 and 2.

Authorized Improvements. The problems attending navigation at Oregon Inlet were manifest as early as the 1960's, and the Congress authorized navigation improvements in the area in 1970. The Manteo (Shallowbag) Bay project was authorized by the River and Harbor Act of 1970, Public Law 91-611, on December 31, 1970, as described in House Document No. 91-303, 91st Congress, Second Session, dated April 8, 1970. Included in this authorization was the stabilization of Oregon Inlet with a dual jetty system and a means to bypass sand around the inlet, a channel 20 feet deep by 400 feet wide through the ocean entrance at Oregon Inlet, a channel 14 feet deep and 120 feet wide from the ocean entrance to and through Roanoke Sound, to and including a 15-acre basin of the same depth at the harbor of Wanchese located near the southern tip of Roanoke Island. Enlargement of Wanchese Harbor has been completed by the State of North Carolina under a Section 215 agreement. The proposed jetty design is shown on Figure 3.

The USACE disagrees that the authorized project dimensions are no longer needed. We have great difficulty maintaining the existing navigation channel and currently use over depth dredging to 17 feet in order to provide some advance maintenance and keep the channel open longer. Even with these efforts, full project dimensions are only available about 25% of the time. If we targeted a channel with even smaller dimensions, it would be even more difficult to assure safe passage.

NOAA identifies four key elements as the basis for their referral; interference with larval transport at the inlet, accelerated beach erosion with attendant impacts, inadequate analysis of the No Action alternative, and improperly supported mitigation. We believe that each of these issues has been thoroughly considered during plan formulation and has been adequately addressed in previous General Design Memoranda and Environmental Impact Statements, including supplements. Our specific replies to each of these issues are included in the sections that follow. The replies are presented in a manner to follow the issues presented by NOAA. For convenience, the text of NOAA's position is included in italics, followed by the USACE response. Where the Corps' response relies on previous studies, we will refer to those studies and enclose copies thereof.

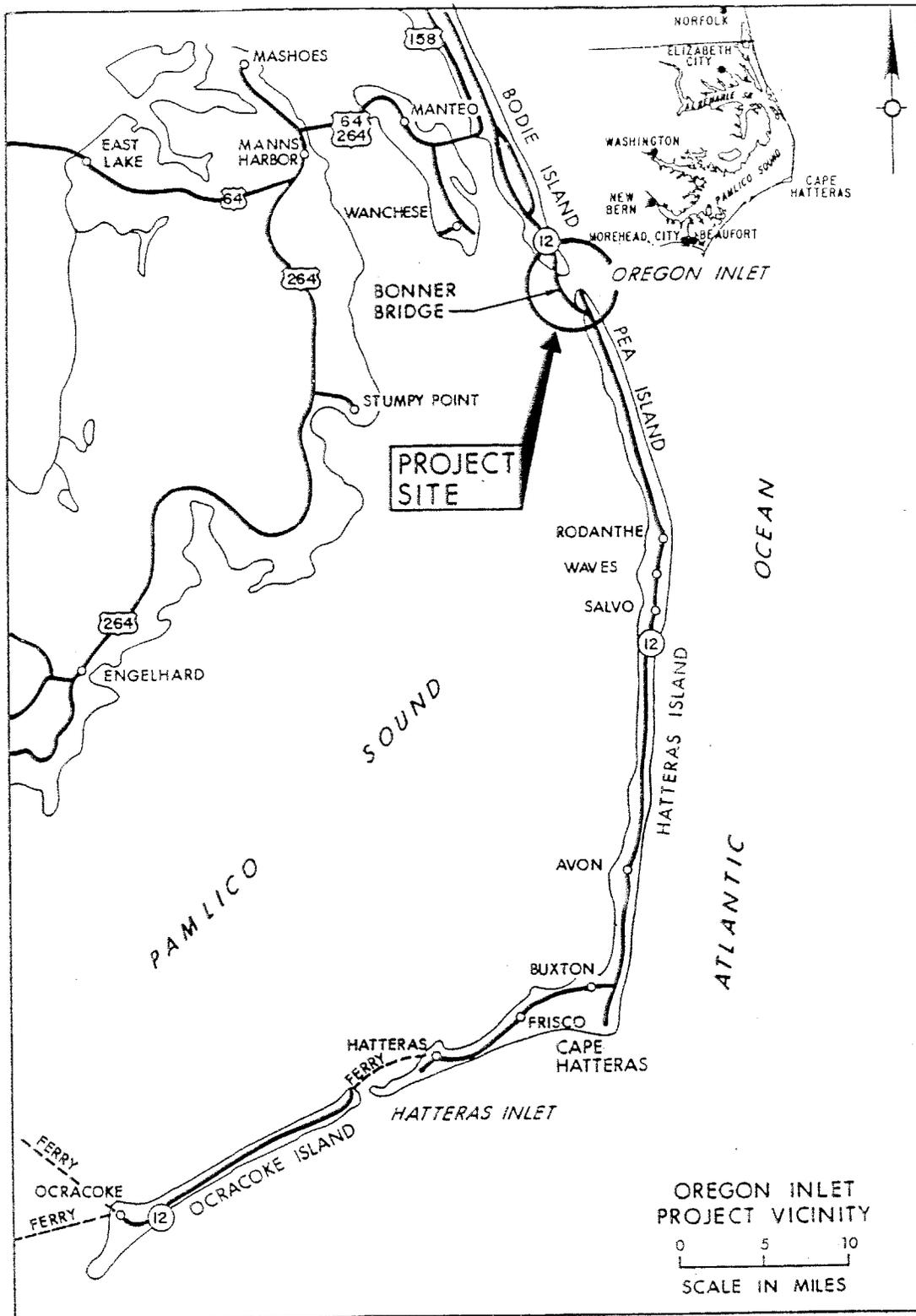
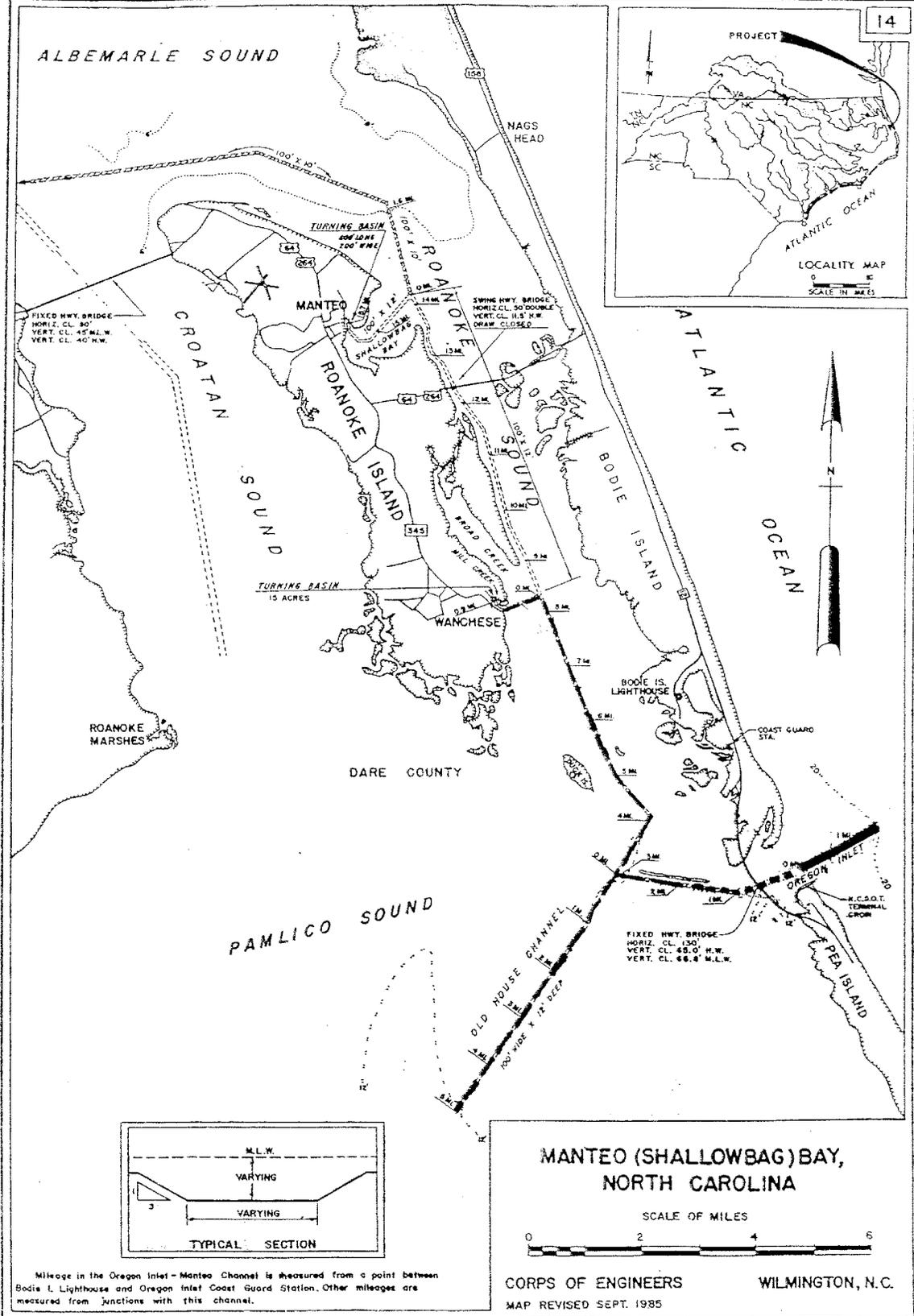
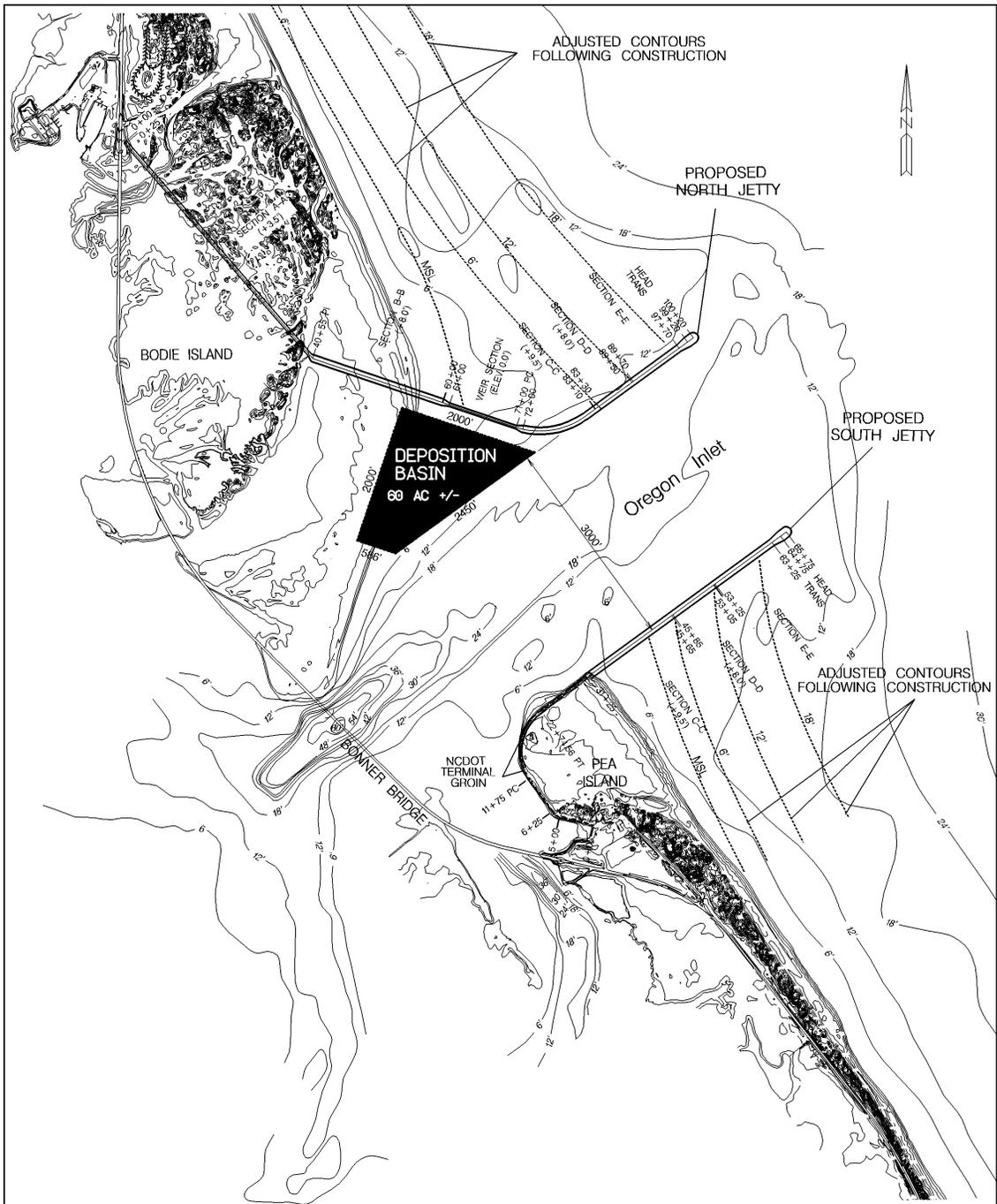


FIGURE 1



Mileage in the Oregon Inlet - Manteo Channel is measured from a point between Bodie I. Lighthouse and Oregon Inlet Coast Guard Station. Other mileages are measured from junctions with this channel.

FIGURE 2



NOTES:

1. MAPPING BASED ON AERIAL PHOTOGRAPHY FLOWN 6 DEC 1996.
2. HYDROGRAPHIC SURVEY DECEMBER 1996 (DEPTHS ARE IN FEET, MSL)

2000 1000 0 2000 4000
SCALE IN FEET

FIGURE 3

x:\dgn\oregon\0797\0973-7.dgn

REFERRAL ISSUES

40 CFR 1504.3 (c)(2) (i) Identify any material facts in controversy and incorporate (by reference if appropriate) agreed upon facts

1. According to the FEIS, significant adverse impacts involving larval transport of marine species will not occur.

NOAA Position: *NOAA does not agree with this COE determination since it is based almost exclusively on two studies that provide no reasonable evidence regarding the effects of building jetties at Oregon Inlet. The first investigation is an analysis prepared by A. J. Metha and C. L. Montague, independent investigators hired by the COE, who examined "fundamental concepts and available literature on a variety of inlets, including reported results of numerical and physical models." The COE places great significance on the contractors' determination that, "We were unable in our examination to detect any large (>10%) negative impacts of jetties at Oregon Inlet." The second study includes results of investigations from Aransas Pass in Texas that, according to the FEIS (page 6-16), "found no appreciable effects" caused by jetties.*

While NOAA agrees with the COE that the Metha-Montague study provides insight into factors that affect larval transport, the level of analysis provided is not sufficient to support a "no significant effect determination" with regard to larval transport at Oregon Inlet. This is evidenced by the study team's acknowledgment that, "However, many considerations relevant to larval impact were identified that remain unquantified due to scant information on this particular subject, or due to computational complexity beyond the scope of this opinion. Hence, potentially significant impacts can by no means be ruled out."

NOAA believes that the assumptions made by the COE for the Aransas Pass study, which the COE cites as evidence that jetties do not "appreciably affect" larval transport, are simply not supported. The study neither presents nor evaluates changes in larval abundance that occurred before and after jetty construction and no measure of the level of change that may or may not have occurred is given. Consequently, for this study to have relevance in this case, one would have to accept the premise that mere presence of larval forms in the vicinity of jetties is proof that jetties do not appreciably affect larval transport. Support of this conclusion is not possible based on either rational thought or scientific evaluation. To further elucidate our concern and disagreement with this line of thought, its applicability in connection with building jetties at Oregon Inlet would also necessitate presumption that the physical environment at Aransas Pass, Texas, is similar to that at Oregon Inlet and that extrapolation of data is possible. This is neither likely nor demonstrated.

Although not cited by the COE, their most recent evaluation of jetty impacts also does not support their views provided in the FEIS regarding the effects of jetties on larval transport. Specifically, they have found that no conclusive evidence exists to support or

discount jetty impacts on egg and larval transport. This fact is true even where jetties have been present for relatively long time spans of time. According to the COE publication "Environmental engineering for small boat basins" [COE. 1993. Washington, DC. 39p]:

"Early life history stages, namely eggs and larvae, of many important commercial and sport fishes and shellfishes are almost entirely dependent on water currents for transportation between spawning grounds and nursery areas. A concern which has sometimes been voiced by resource agencies in relation to jetty projects is that altered patterns of water flow may adversely affect transport of eggs and larvae. Those eggs and larvae carried by longshore currents might be especially susceptible to entrapment or delay in eddies and slack areas formed adjacent to updrift jetties at various times in the tidal cycle. Even short delays in the passage of eggs and larvae may be significant because of critical relationships between developmental stage when feeding begins and the availability of their food items. All aspects of this potential impact remain hypothetical. No conclusive evidence exists to support either the presence or absence of impacts on egg and larval transport. This fact is true even where jetties have been present for relatively long spans of time. [emphasis added] The complexity of the physical and biological processes involved would render field assessments of this impact a long-term and expensive undertaking. The results of hydraulic modeling studies related to this question have been inconclusive. Future modeling studies combined with field verification studies may provide insight into resolving the validity of this concern."

NOAA readily acknowledges that the affects of jetties on larval transport are undetermined. On the other hand, available data, including that developed by the COE, clearly demonstrate that building jetties at Oregon Inlet will induce major change in currents and other factors that control larval transport, and the movement of larvae through the inlet. To better define the level of possible reduction that may occur with jetties, NOAA scientists have examined current data on larval transport from Oregon Inlet and other inlets in North Carolina. Using a baseline transport reduction estimate of 60 percent, that was derived from an October 1980 study performed by the COE's Waterways Experiment Station (using a scale model of Oregon Inlet), researchers at the NOAA/National Ocean Service Center for Coastal Fisheries and Habitat Research (CCFHR) determined that such reductions (60 percent) cannot be ruled out and are within reason. The 60 percent reduction estimate was also evaluated and is accepted by Dr. John Miller at North Carolina State University (NCSU), who is a recognized authority on larval transport and factors influencing fishery production in North Carolina estuaries.

In the absence of conclusive evidence that a single, fixed impact level exists, NOAA believes that, at a minimum, a range of reasonably foreseeable larval reduction values should have been developed and evaluated. With regard to decision making, the difference in the magnitude of impact between larval transport reductions of 10 percent and 60 percent are significant. NOAA would not support even the lowest projected larval

reduction of 10 percent because this would cause a significant reduction of fishery resources. If the larval transport levels are reduced by as much as 60 percent, the upper level considered by a different study, such an effect would be completely unacceptable to NMFS.

Based on the preceding, the COE's determination that significant reductions in larval transport are not reasonably foreseeable is unsubstantiated and we do not agree with that determination. In the absence of a more accurate description and adequate evaluation of reasonably foreseeable impacts and mitigation, NOAA believes that the FEIS is deficient to the point where its use for decision making would contravene the purpose, requirements, and intent of NEPA.

USACE Response: The FEIS Supplement III conclusion that construction of the jetties will not significantly impact larval transport is warranted by all available scientific information collected over many years. The USACE believes that the FEIS Supplement III adequately describes the reasonably foreseeable impacts of the construction of the jetties and serves as a proper decision-making tool for this project. In their position, NOAA states that affects of jetties on larval transport are undetermined. Knowing this, it seems that the NOAA opinion to the contrary is based on only a partial review of the facts. Our conclusions are based on a number of studies over two decades of coordination and analysis - far more than two studies cited by NOAA.

The USACE assessment of the reasonably foreseeable impacts of the proposed jetties on larval fish and shellfish resources is based on a thorough review and analysis of the best scientific information, including a consideration of the views of those agencies with statutorily mandated stewardship and management responsibility for those resources. While the USACE relied in part on the two referenced studies, those studies represent only a fraction of the work and discussion within the scientific community to address the complex issue of larval transport. The analytical processes involved with identifying and evaluating the effects of the proposed project and alternatives on larval transport have been on going for over two decades.

This issue was first raised in 1977 by review agencies, including NOAA, and in response to that concern, the District began a thorough investigation of the issue. The issue was discussed in the original EIS for the project, filed with CEQ on 20 April 1979, and in each of the subsequent three supplements. After filing the FEIS, the USACE contracted a literature review and assessment of potential project impacts (Applied Biology, July 1980). This is included as Attachment 1. It also performed physical modeling at the Waterways Experiment Station (WES, October 1980) to try to determine what types of potential impacts might reasonably be expected. A copy of this report is included as Attachment 2. Each of these efforts failed to determine that any significant impacts were probable, but neither effort was conclusive because definitive data was not available.

The USACE then determined to acquire the data necessary to more definitively address the issue. To obtain the expertise necessary to conduct this effort, the USACE

established an Advisory Board for an Oregon Inlet Larval Transport Study in 1981. This Advisory Board consisted of 4 members: Dr. David Colby, NMFS; Dr. B. J. Copeland, N. C. Sea Grant; Mr. Art Hurme, Coastal Engineering Research Center; and Mr. Harrel Johnson, N. C. Division of Marine Fisheries. This Advisory Board assisted the District in development of an appropriate study design. Based on the recommendations of this board, the USACE was prepared to initiate studies with the Virginia Institute of Marine Science. However, a letter from the NMFS, Beaufort Lab (David Colby, 1981) (Attachment 3) indicated that there was little likelihood of a satisfactory study outcome given the high natural background variation in larval fish and shellfish populations. Based on his analysis, he recommended that the study not be undertaken unless substantially more funds and time could be allocated. Because an NMFS Advisory Board member identified concerns regarding the USACE's ability to actually isolate the potential impacts of jetties, and the Advisory Board could not come up with any other reasonable recommendations to overcome this concern, the decision was made not to pursue the study.

In a continuing effort to address this issue, the USACE sponsored a symposium of American Fisheries Society (Symposium 3, August 19-20, 1985) attended by fisheries scientists from around the country. While this symposium determined that physical and hydrological modeling of jetties might provide some useful insights into jetty construction impacts, it also determined that the definitive studies of larval distribution and behavior actually required to assess project impacts would "require funding at a level difficult to justify relative to costs of construction and the perceived value of the project" (Weinstein, 1988). Based on the results of this symposium, the USACE decision not to do the studies was confirmed. The proceedings of that symposium are included as Attachment 4.

In a more recent attempt to take a fresh look at the issue, the joint DOI/COE project review team hosted another workshop on October 7, 1991 in Raleigh, NC. Participants of that workshop were unable to provide new insights into either the reality or significance of the larval transport issue. The joint review team also determined that a totally independent review of the issue should be conducted. The USACE contracted the University of Florida to provide this review. This report (Mehta and Montegue, 1991) stated, "We were unable in our examination to detect any large (>10%) negative impacts of jetties at Oregon Inlet, and in fact small positive impacts were explored that could possibly offset small negative impacts. However, many considerations relevant to larval impact were identified that remain unquantified due to scant information on this particular subject, or due to computational complexity beyond the scope of this opinion. Hence, potentially significant impacts by no means can be ruled out." Their report is included as Attachment 5. The most recent report cited by NOAA (COE 1993) again does not cite any evidence to support claims of significant potential impacts. We are unable to use input from the most recent workshop or from either of these reports to determine that significant impacts to larval transport are reasonably foreseeable.

We believe that NOAA's use of a potential larval transport reduction figure of 60% is inappropriate and misleading. The study cited (WES 1980) reported on a simple

sensitivity modeling effort conducted by the Waterways Experiment Station. In that study, which used floating and only slightly buoyant floats to test particle movement, the authors state, “the effects observed during flood flows represent a worst case situation. That is, the effect observed in the model may occur at the onset of jetty construction, but may moderate over time, since fillet accretion will effectively reduce the length of the jetties into the ocean beyond the littoral zone.” Furthermore, the figure of a 60% reduction in transport can only be derived from the tests using 2-foot waves, with waves from N24⁰E, for bottom drifting larvae. Other tests using 2-foot waves yielded reductions of only 11% and 8% for surface larvae, and 35% for bottom larvae. Even under “non-jetty” tests, bottom floats did not enter the inlet as well as surface floats (38% of bottom floats successfully transported versus 60% surface floats for one test, and 23% versus 58% for the other). Combining the results of these tests indicates that there is a 52% reduction in successful larval transport on the inlet without jetties simply if surface larvae move to the bottom. Test results for 3.5-foot waves were not even reported. Clearly, the results of this limited study must be used with great caution. The report itself indicates, “At this time it cannot be determined whether the results of the sensitivity study indicate that a problem will be caused by the introduction of the jetties, even though transport patterns appear to be modified. Information on larval transport patterns and distributions as they exist at the prototype inlet are essential before it can be determined that the effects observed in the model study are beneficial, insignificant, or adverse.” We believe that singling out one test result from one set of parameters examined in this study to make a case for an extremely significant impact, in spite of other data sets and the obvious caveats of the authors, is an inappropriate way to use the information generated by the study. In addition, in spite of extensive NEPA coordination, we have not been informed of support of this 60% figure from any other party. To our knowledge, nobody in the 1985 symposium or the 1991 workshop advocated acceptance of this figure. We have not been provided a copy of the referenced positions of acceptance from either the NOAA/National Ocean Service Center for Coastal Fisheries and Habitat Research or Dr. John Miller, nor was it provided during the NEPA process. We have received correspondence from Dr. Miller, of NCSU as recently as February 1999, and he does not mention support for the 60% figure.

Based on the history of this issue, the USACE believes it has been responsive to the concerns raised by NOAA. In each case, the independent investigators involved have been unable to determine that any significant impact from jetty construction is likely. The only study that actually produced data on this issue was done at Aransas Pass Inlet, Texas, and it determined that larvae successfully passed through jetties to the interior. There are two other jettied inlets in North Carolina (Masonboro and Beaufort), and many other inlets with jetties in U.S. waters, and nowhere has there been a noted decline in fisheries resulting from impaired larval transport at those structures.

In summation, in spite of repeated attempts to assess potential impacts, the postulated impacts of the proposed project on larval fishes still cannot be quantitatively supported. We have consulted independent experts on multiple occasions and all of the potential impacts envisioned by NOAA continue to be unsubstantiated. Moreover, in the two decades that have passed since this issue was first surfaced, no actual impacts from

similar projects have ever been demonstrated by the NOAA or any other agency. We believe it to be quite probable that if jetties were interfering with larval transport of such a grand scale throughout the country it would have been reported.

Our position on the larval transport issue has been coordinated with the public, state and Federal agencies, and the academic community on multiple occasions, including the latest FEIS Supplement III. All concerns elevated by others have been investigated and addressed. Over the past twenty years we have devoted considerable effort to analysis of this issue and have been receptive to any information that would improve our understanding of the matter. The FEIS Supplement III is not deficient simply because it did not lend credence to potential scenario such as that envisioned by NOAA. In point of fact, it recognized opposing views and directed readers to read the NOAA letter to obtain an explanation of its concerns (Section 6.06.3, page 6-17). As stated previously, we cannot find any evidence that would support such effects as reasonably foreseeable impacts of the proposed project. NOAA has not provided us with such evidence. All available information indicates that impacts of the jetties on larval transport should be minor. Any other conclusion at this juncture is not supported by any available documentation.

2. According to the FEIS, impacts to aquatic habitats and resources located in Roanoke and Pamlico Sounds will not occur and, if realized, can be offset through mitigation.

NOAA Position: *As in the case of its no significant effect determination for larval transport, the COE provides no reliable evidence to support this claim. On the other hand, they dismiss credible evidence which indicates that significant impacts are reasonably foreseeable, if not probable. This situation is exacerbated by the absence of a reliable plan for mitigation in the event that significant adverse impacts are realized.*

The COE has intensively studied the anticipated effects of jetties on geomorphology and has considerable information and data which support their conclusion that, with timely and adequate sand bypassing, accelerated beach erosion and more frequent island overwash will not occur. However, we also believe that the COE has a statutory responsibility pursuant to NEPA to adequately consider and address other credible views and information. This is particularly true when there is almost unanimous agreement that the COE's findings may be inaccurate and could result in action that causes major, if not catastrophic, environmental harm. Specifically, the MSBP has been the focus of numerous studies by independent and non-government scientists hired under contract to the Department of the Interior, and by investigators from academia and government agencies. Contributors include Dr. Douglas Inman of Scripps Institute of Oceanography, Dr. Orrin Pilkey of Duke University, Dr. Robert Dolan of the University of Virginia, Dr. Robert Dean of Florida State University, and other experts in the field. The conclusion reached in every investigation by these researchers is the same: building jetties at Oregon Inlet has significant probability of causing accelerated beach erosion and increased frequency and magnitude of overwash of coastal barrier islands located to the south of the inlet. There is also agreement among non-COE investigators that sand

movement through the inlet will be altered and the processes that build and maintain shoals, aquatic grass beds, emergent wetlands, and other productive habitats will be altered.

In view of the large amount of highly credible information which demonstrates that resources and their habitat under purview of NOAA could be significantly and adversely affected, we do not believe that the COE should go forward with the preferred jetty alternative. In the event that the jetties are built over our objections and those of many others, the technical aspects of environmental monitoring and mitigation would need greater attention than is provided in the FEIS. Much greater detail would be needed to ensure that impact detection and remediation are adequate. The COE would need to evaluate possible levels of impact to wetlands and other habitats resulting from greatly accelerated barrier island erosion and overwash. Although the COE has been reluctant to disclose the costs associated with environmental monitoring and mitigation of substantial impacts, such disclosure is needed since the existing authorization contains no provisions for funding these actions. Although the COE addresses this by noting that funds for these activities could be provided via other authorities, this funding is unreliable and may not be forthcoming or timely.

To summarize, there is good reason to anticipate that significant environmental harm will result from building jetties, and there is no meaningful plan or designated funding available to address this harm. As such, NOAA cannot support the COE's preferred jetty alternative.

USACE Response: An integral part of the proposal to construct the jetties is the execution of a sand management plan that would assure that the erosion and island overwash concerns expressed by NOAA would not be realized. As such, the presage of significant environmental harm is unlikely to occur.

Based on a thorough review of the best available scientific information and consideration of the views of the resource agencies and stakeholders, the USACE has developed a proposed project that includes features to prevent the erosion and island overwash that is the subject of the NOAA concern. Consequently, significant environmental harm as a result of erosion and overwash is not likely to occur. We have discussed potential impacts of the project on aquatic habitats and resources of the area in the original EIS and in each EIS supplement. The recommended project includes sand bypassing as an integral part of the plan specifically to address these issues. Based on our analysis, we anticipate that with sand bypassing the sediment budget of the barrier island system will remain in balance and the shoreline erosion and island overwash will not exceed background. It appears from our review of the record that the basis of NOAA's concern may lie more with whether sand bypassing will be funded. USACE has always recognized that in the absence of bypassing erosion and increased overwash could occur. The authorizing legislation for the project specifically directs that sand bypassing be performed and there is no reason to believe that bypassing would not continue to be performed as an integral part of the project.

Because of the concerns raised by the consultants of the Department of the Interior (DOI) and others about the jetty project, a joint task force was formed to address all project issues with the principal focus being on the impacts of the jetties and sand bypassing on the adjacent shorelines. The task force, which consisted of representatives of the Wilmington District Corps of Engineers, DOI, and DOI consultants, (including Dr. Robert Dolan, and Dr. Robert Dean) met regularly over the course of about a year during 1991.

As a result of the DOI/COE task force meetings, the USACE made a number of significant changes to the sand bypassing plan to help alleviate the concerns of DOI. The first change was the elimination of a controversial component of the sand bypassing system that consisted of an innovative transportable breakwater. DOI was concerned that this new technology had not been fully developed and questioned its operational capability. Secondly, the frequency of proposed sand bypassing was increased from every other year to an annual occurrence. With annual bypassing, response to erosion problems, should they occur, would be much more timely. A third significant change was that the USACE agreed to double the area of sand management from 3 miles to 6 miles north and south of the inlet. The 6-mile zones north and south of the inlet were based on the results of the shoreline response modeling performed as a part of the joint DOI/COE task force efforts, which indicated that post-jetty construction impacts would be limited to the areas less than 6 miles from the inlet with the most likely areas of impact located within 3 miles of the inlet. DOI representatives recommended that project responsibility be limited to this area and the USACE agreed to assume the responsibility of erosion mitigation within it. This agreement establishes erosion thresholds and that if the thresholds are triggered, the USACE will mitigate for this erosion *whether or not* the erosion was caused by the project (i.e., it will address naturally-occurring erosion as well as project-induced erosion). Fourthly, the USACE developed and agreed to maintain a comprehensive monitoring program to help identify project impacts and effectively manage the sand resources in the Oregon Inlet area.

As a result of this process, the Wilmington District Corps of Engineers prepared a Feature Design Memorandum on Sand Bypassing (Management) dated July 1995. The results of this FDM are included in FEIS Supplement III. The FDM clearly establishes shoreline monitoring methodologies and erosion thresholds that will determine placement, frequency, and quantities of material to be bypassed. The USACE has repeatedly indicated that if sand bypassing did not occur, shoreline erosion could be catastrophic (see FEIS Supplement III, Section 3.02, page 3-2). Indeed, this concern was the whole purpose of the FDM on sand bypassing. However, with adequate sand bypassing, such impacts will not occur.

The possibility of indefinable impacts to estuarine resources is recognized in the FEIS Supplement III (see Section 3,04.3, page 3-18). It is for this reason that monitoring is proposed as a part of the project plan. The types of habitat of concern to NOAA (shoals, aquatic grass beds, and emergent wetlands) survive in dynamic systems and are frequently disrupted by natural events. These habitats reestablish readily and therefore are prime candidates for additional mitigation, if required. Creating the proper substrate,

elevation, and grade, and then planting with desired species have created all of these habitat types elsewhere in the state. There is no reason to believe that they could not be successfully established in the project area. We will perform additional mitigation if the monitoring program detects significant impacts.

We recognize that greater detail will be required in the development of an adaptive monitoring plan that responds to resource concerns and is flexible enough to respond to changed conditions and resource interests. It is clearly stated in the FEIS Supplement III (see Section 3.04.4, page 3-18) that a collaborative effort among the USACE, USFWS and other state and Federal natural resource management agencies will be needed to determine which project area resources should be monitored and to develop the technical aspects of the monitoring plan. Similar team approaches to monitoring have recently been used successfully at Wilmington Harbor and are currently being used for the Dare County Beaches project. In recognition of the great amount of time that has elapsed since this project was first authorized and the amount of time that may yet elapse in the future with resulting changes in resource conditions and national priorities, we consider it unwise to develop a fixed monitoring program at this time. Accordingly, the monitoring plan is proposed as an adaptive concept with a reasonable level of funding allocated. Funding levels currently anticipated are provided in the FEIS Supplement III in Section 8.05 (see page 8-81). If, as indicated in the FEIS Supplement (see Section 3.04.4, page 3-18) the list of resources to be monitored is expanded, additional funding will be required. Finally, we see no reason to believe that adequate funding for this work cannot be obtained. While the USACE has no direct control over Federal appropriations, historically, the USACE has been faithful in acquiring funds to maintain Federal water resources projects. At this point in time, there is no reason to believe that the USACE will be unable to acquire adequate funding.

3. According to the FEIS, adequate mitigation for any reduction in movement of larval fish and invertebrates through the inlet can be offset by adding a weir structure.

NOAA Position: *As has been pointed out by researchers at the CCFHR, the NMFS, and NCSU (Dr. John Miller), the effectiveness of the weir section as a functional passageway for larvae is highly speculative and untested. Even though the proposed 1000-foot-long weir section, with an elevation equal to mean tide level, will permit overflow from mid-flood through mid-ebb it cannot be assumed that it will serve as an effective passageway for larval fish and invertebrates.*

The proposed weir would begin at the shoreline and extend offshore joining the main jetty at a water depth of around one meter below mean sea level (based on the adjusted water depth after jetty construction). Mean tidal ranges in the inlet are 0.6 to 0.7 meters. Thus, maximum water depths at the distal end of the weir would be around two meters. Since little is known about species composition, distribution, and abundance of larval fishes in such shallow water outside of inlets, the COE's assumption that larval transport will occur is unfounded. Differences in species composition, distribution (both horizontal and vertical), and abundance of larval fishes have been found during previous studies

conducted in waters 5-10 meters deep in and around the ebb-tide delta at Oregon Inlet and other inlets. These results suggest that the weir alternative may not be favorable for some species since they were not found at the weir depths or because they enter the inlet in bottom water flows. This concern is supported to some degree by the COE's numerical and physical modeling studies of flows at Masonboro Inlet, North Carolina, which indicate that flows through the weir section were minimal and that substantial zones of no net movement of water (eddies) exist along the updrift side of the jetty including the area where the weir is located.

In addition to a complete absence of reliable information to indicate that the weir will function as a passageway for larvae, there is considerable evidence to indicate that the weir could become blocked by sand. In this case, it would not only cease to function as a possible avenue for larvae movement, but it would also cease to function with regard to the essential sand bypass requirement of the jettied inlet. This situation is referenced in the Wilmington District's 1995 Feature Design Memorandum for Sand Bypassing Management which, in rejecting plans for a weir states, "The major concerns, particularly with the weir jetty plan, were the high rates of littoral (sand) transport that could occur during singular or multiple storm events, and the possibility of reversals in the net direction of littoral transport during any year. Also, the amount of material available for bypassing would be limited to that retained in the sediment trap. With respect to storms, sand transport could be so large that the weir would become 'landlocked,' thus preventing the deposition of material in the sediment trap".

In summary, based on the scientific evidence stated above, including the COE's own analysis of weirs, use of the proposed weir would not provide adequate mitigation for disruptions in larval transport.

USACE Response: The inclusion of a weir in the north jetty enhances the prospects for successful larval transport through the inlet. NOAA's concerns that it may become landlocked are unfounded in light of the information available.

The USACE positions on larval transport stated in its documents are based on careful review of engineering and scientific data. As stated previously, we have carefully examined this issue and have consulted experts on numerous occasions. Based on a careful analysis of this issue, we concluded that the inclusion of the weir in the north jetty enhances prospects for successful larval transport past the jetty. It is by no means certain that any significant adverse impacts to successful larval transport would be caused by the presence of the jetties, even at the originally proposed lengths without a weir. However, at the Raleigh larval transport workshop, most participants believed that if the jetties could be shortened and a means of facilitating nearshore waters into the inlet could be devised, potential impacts might be lessened. Such potential benefits were again highlighted by Mehta and Montague (1991) who stated "it is self-evident that since the shorter the jetty the less likely the impact, it is desirable to have the shortest possible jetties ..." and further recommended investigation of submerging portions of the jetties to enhance water exchange.

NOAA states that the FEIS Supplement III claims that the weir section would provide “adequate mitigation” for potential reductions in the transport of larval organisms. The FEIS Supplement III states only that it would facilitate water exchange between the inlet and adjacent nearshore areas. Consequently, the inclusion of a weir in the north jetty enhances the prospects for successful larval transport through the inlet. Careful reading of FEIS Supplement III (see Section 6.06.4, page 6-17) shows that with jetty shortening and provision of a weir, the USACE “believes that it has incorporated every practicable larval transport feature into the plan and that the overall impact of the recommended plan on larval organisms will be minimal...” However, that discussion also indicates that impacts are still not completely known and it directs readers to letters in appendices that detail opposing views. It is still the position of the USACE that the weir structure, designed for the turbulent waters of the surf zone, will be able to pass larval fish under most conditions. Indeed, if these structures are capable of passing sediment from the nearshore ocean bottom, there does not appear to be any reason to believe that larval fish and shellfish residing in this area could not pass over as well.

The weir was incorporated into the jetty plan to open up the surf zone passageway thought to be an important travel route for some larvae. This was based on evidence that the fish larvae in the ocean waters near Oregon Inlet generally travel westward until they encounter the shoreline then migrate towards the inlet carried by alongshore currents (Dr. John Miller, personal communication) Upon reaching the weir portion of the jetty, water, sediment and larvae are expected to flow over the structure over the entire flood portion of the tidal cycle. Larval organisms approaching the inlet from other pathways will be carried via tidal currents between the jetties. The jetties have been designed to have the same flow conveyance as without the structures in place and therefore larval exchange should also remain the same.

Upon review of the Masonboro Inlet physical and numerical modeling studies, the USACE cannot support the NOAA claim that the flows over the weir were minimal and that substantial no net movement of water exist along the updrift side of the jetty. Our examination reveals that surface current images of the model under peak flood conditions show vigorous flow over the weir. This is true even under model conditions driven by tidal action only, excluding waves. The presence of waves and attendant alongshore currents will contribute to the flow over the weir section and mixing in the fillet area.

A further consideration in comparing the tidal flows at Masonboro Inlet and Oregon Inlet is the phasing of the tide. At Oregon Inlet, the peak flood flow through the inlet occurs at the time of high tide, i.e. the tidal currents and tide heights are in phase. This condition is optimal in terms of flow over the weir and the passage of larval organisms since the flood currents will occur over the weir over the entire upper portion of the tidal cycle from mid-tide rising through high tide to mid-tide falling. By comparison, at Masonboro Inlet the tidal currents and heights are partially out of phase with the peak flood flows preceding time of high tide. In other words, flow over the weir is more limited at Masonboro Inlet than it would be at Oregon Inlet.

Reconsideration of the weir was done in response to a request by the U.S. Fish and Wildlife Service to include low sills in the jetties to allow larval fish to enter the inlet as fully discussed in section 3.4, page 3-16 of GDM Supplement No. 2. In terms of sand management and control of sediment, the USACE still favors the use of impermeable structures. This is clearly stated in the July 1995, FDM. In the interest of accommodating the larval transport concerns, the use of the weir was revisited. Since more experience was available with the performance of weirs in the management of sediment versus the uncontrolled multiple low saddle sections, or other means, the weir concept was again recommended.

Further experience gained with weir jetties, since the first weir jetty was built at Masonboro Inlet in 1966, has shown that sanding-in has not occurred. In the case of the weir jetty located at the north side of Masonboro Inlet, this structure has never become landlocked over its 35-year history. Over this time, the structure has been exposed to many major storms including hurricanes Diana, Bertha, Fran, Bonnie, Dennis and Floyd. These storms transported very large quantities of sediment, in some cases overtopping the dune and flooding the streets of the town with sand. High volume sand movements also occurred in the vicinity of the weir. In spite of such events, with tremendous quantities of sand movement, the weir has not become landlocked. Our experience shows that with proper design, NOAA's concern about weir structures such as that used at Masonboro Inlet becoming landlocked are unwarranted.

40 CFR 1504.3(c)(2)(ii) Identify any existing environmental requirements or policies which would be violated by the matter.

1. CEQ regulations regarding minimum requirements of an environmental impact statement, 40 CFR 1502.

NOAA Position: The COE did not follow CEQ regulations concerning the analysis of alternatives and analysis of reasonably foreseeable impacts. As noted in the CEQ regulations (40 CFR 1502.14), the alternatives analysis is, "the heart of the environmental impact statement," yet, as discussed below, the COE did not fully consider a feasible environmentally acceptable alternative. The COE also violated CEQ's regulations governing consideration of environmental consequences at 40 CFR 1502.16. Additionally, the COE violated the purpose of a NEPA analysis set forth in the CEQ regulations at 40 CFR 1500. 1 (c), which states that, "NEPA's purpose is not to generate paperwork - even excellent paperwork - but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on an understanding of environmental consequences, and take actions that protect, restore, and enhance the environment." An action that would jeopardize a nationally important refuge for wildlife, a publically owned seashore, and immensely productive and valuable fishery habitats cannot be regarded as "excellent" by any standard in striving for harmony between man and the environment. Because of its immense natural beauty, value as a vastly productive aquatic ecosystem, and importance as a publically owned National Wildlife Refuge and National Seashore, the project area should be given the highest level of protection afforded by environmental requirements and policies.

With regard to the inadequacy of the alternatives analysis, the COE's evaluation of the No Action Alternative is limited exclusively to results of efforts to provide the authorized 20-foot-deep by 400-foot-wide channel dimensions at the ocean bar. Although we agree that evaluation of this parameter is warranted, an analysis of the actual results attained, irrespective of the authorized dimensions, is needed. This characterization of the no action alternative is too limiting because it does not take existing conditions into account.

Specifically, in connection with the No Action Alternative, the FEIS does not consider that the target channel dimensions used (20 feet deep by 400 feet wide) have little relationship to existing navigation needs at Oregon Inlet. The target channel dimensions were developed in the 1970s and were designed to accommodate intensive fishing efforts that would rely on deeper draft vessels and continuous navigation access across the ocean bar. This projected fishery never materialized and it is doubtful that the early landing projections were even valid. To further emphasize this point, NOAA and the COE agree that all available fish can be taken by vessels that presently transit the ocean bar under existing inlet conditions. This harvest level is possible even though authorized channel dimensions exist ". . . less than 24 percent of the time" (page 723, paragraph 2, of the Draft EIS). With regard to future fishing and navigation needs, NOAA has advised the COE that most offshore fisheries are overcapitalized and we anticipate that the size of the fleet will be reduced as owners seek greater efficiency through use of fewer vessels. This will be particularly true for the 10 to 30 years that it will take to rebuild over-fished fisheries such as sea scallops, swordfish, sharks, and summer flounder.

The COE's channel dimensions used in the No Action Alternative are not limited strictly to projected navigation needs developed in the 1970s; they have basis in terms of present day physical conditions and navigation needs for some vessels which rely on Oregon Inlet. These factors do not, however, negate the requirement to identify and assess reasonable alternatives to the proposed action that may avoid or minimize adverse impact on the quality of the human environment. The existing navigation maintenance efforts at Oregon Inlet seem to meet this requirement and need to be fairly and objectively evaluated.

In consideration of clear evidence that fishing and navigation occur under existing conditions at Oregon Inlet, NMFS performed a cursory, but straightforward examination of costs and benefits for the existing 14-foot project (i.e., the No Action Alternative based on actual conditions) and the Jetty Alternative. The results of this admittedly facile analysis indicate that economic benefits of the No Action Alternative, when analyzed independent of the authorized project dimensions, could exceed those of the Jetty Alternative. Using figures developed by the COE, we submit that:

- Annual cost for the existing 14-foot Project is \$6,949,000 (Table 7.7 of the Draft EIS). Using projected annual "benefits" of \$17,986,000, the value of fish landed through Oregon Inlet according to the North Carolina Division of Marine Fisheries (NCDMF), a benefit/cost ratio of 2.6 is realized.*

- *Annual cost for the jetty alternative is \$10,643,000 (\$6,132,000 for dredging/sand bypassing + \$4,520,000 for interest/amortization on the jetties). Annual benefits include \$17,986,000, the value of fish landed through Oregon Inlet according to NCDMF, and \$7,237,000 which reflects reduced fishing time and increased recreational opportunities, or a total of \$25,223,000. The associated benefit/cost ratio is 2.4; however, costs of environmental monitoring and mitigation are not included.*

While this analysis is an over-simplification of what is needed to determine the proper course of action at Oregon Inlet, it illustrates that the No Action Alternative based on actual conditions at Oregon Inlet merits detailed evaluation in the alternatives analysis. In responding to this information in the EIS, the COE simply claims that, "The required channel is not hypothetical and is correctly analyzed and evaluated." However, this reply misses the point and should not be used to circumvent the impact disclosure and analysis requirements of NEPA.

As presented in considerable detail above, the COE did not perform a fair and objective evaluation of the actual effects of the No Action Alternative. Instead, this alternative was examined on the basis of how it performed in comparison to the authorized 20-foot-deep by 400 foot-wide navigation channel. This approach is not justified given that the 20-foot-deep by 400 foot-wide navigation channel navigation requirement was established in the 1970s for perceived channel dimensions that are no longer needed. More importantly, the evaluation process used by the COE conspicuously ignores the requirement that Federal agencies shall to the fullest extent possible use the NEPA process to identify and assess the reasonable alternatives to the proposed actions that will avoid or minimize adverse effects of the actions upon the quality of the human environment. The evaluation of the No Action Alternative provided by the COE appears to intentionally avoid identification and assessment of an alternative that would minimize adverse effects.

At the same time that the COE fails to fully and accurately describe the effects of the No Action Alternative, which NOAA believes are minor, the COE all but disregards reliable data and scientific opinion which demonstrate that the preferred alternative could cause significant environmental harm. A vast amount of scientific evidence has been submitted which forecasts a high probability that the jetty alternative would (1) cause catastrophic harm due to disruption of timely and adequate sand movement across the inlet; and (2) significantly reduce transport of subadult fish and invertebrates through the inlet and into estuaries where maturation occurs. Information in support of these views was developed by internationally and nationally recognized experts in the fields of coastal geology, coastal engineering, and marine biology. Contributors include Dr. Douglas Inman of Scripps Institute of Oceanography, Dr. Orrin Pilkey of Duke University, Dr. Robert Dolan of the University of Virginia, Dr. Robert Dean of Florida State University, Dr. John Miller of NCSU, and Dr. Larry Settle of the CCFHR. The views of these scientists have been carefully reviewed by biologists and resource managers within NOAA, the FWS, and the NPS, and were conveyed to the COE in support of agency views and positions. While the COE has analyzed and refuted the information presented, the

contrary views they present are no stronger, and are in most instances less convincing, than those developed by non-COE scientists. As such, NOAA believes that to fulfill requirements contained in 40 CFR 1502.16, the FEIS would need to be expanded to describe and evaluate reasonably foreseeable impacts of accelerated beach erosion and barrier island overwash; damage to or loss of tidal flats, emergent wetlands, and submerged aquatic vegetation; and significant reduction of larval movement through the inlet.

We also note that the COE, through its FEIS, does not adequately identify and address two key environmental concerns raised by NMFS, FWS, NPS, non-governmental agencies, and individuals. These include (1) the magnitude and nature of environmental harm resulting from jetties and associated beach erosion, barrier island overwash, and subsequent damage to estuarine habitats and biota; and (2) the range of effects that are possible in terms of jetty-related reductions in movement of larval and post-larval fish and invertebrates through the inlet.

By not fully describing the magnitude of these reasonably foreseeable impacts the COE inappropriately avoided discussion and analysis of a clear and substantial need for mitigation. This contravenes fundamental aspects of the CEQ regulations that require disclosure of significant impacts and consideration of meaningful mitigation. In consideration of the magnitude of impacts that are reasonably possible in connection with building jetties at Oregon Inlet, it is possible that with disclosure of such impacts it could be successfully argued that the appropriate mitigative action would be that of avoidance, or not taking action that would result in the preferred jetty alternative. Of paramount importance is the abundance of valid scientific evidence and expert opinion which shows that significant environmental harm is a reasonable and foreseeable consequence of building jetties.

In summary, the COE alternatives analysis violates CEQ regulations at 40 CFR 1502.14 and environmental consequences regulations at 40 CFR 1502.16 because their evaluations of the No Action Alternative, environmental consequences, and mitigation are inadequate.

USACE Response: The FEIS Supplement III is a product of extensive investigation, analysis and coordination over a period of many years. It has addressed in great detail the views and concerns on the other federal agencies and interested parties and has properly considered alternatives, environmental consequences and mitigation.

The USACE has fully complied with NEPA, the CEQ guidelines, and the Principles and Guidelines for Water Resources Planning. Having prepared the original EIS on the project and three supplements, we have done a tremendous amount of work to share the planning process and disclose the anticipated impacts of the project. Every environmental statement has discussed alternative actions and these documents were furnished to all known interested parties and the public. Every comment and suggested alternative has been considered and evaluated. We have worked extensively with NOAA

and the North Carolina Division of Marine Fisheries to reach consensus on current and future fish stocks and quantify fish catch projections. We believe we have an excellent NEPA record and have developed an excellent project.

We disagree that we have not evaluated a feasible environmentally acceptable alternative. As discussed below, we have evaluated every aspect of the No Action Alternative. The methodology used is consistent with the Principles and Guidelines for water Resources Planning and USACE policy and this analysis has been reviewed and approved by the USACE at the Washington level. The GDM Supplement No. 2 and FEIS Supplement III clearly lay out that analysis methodology and carefully explain the results. In spite of the reservations of the NOAA, we believe our analysis fully complies with NEPA and reflects best science and coastal engineering practice.

The No Action Alternative is not limited exclusively to the results of providing the authorized 20-foot deep by 400-foot-wide channel but instead consists of continued dredging of the present 14-foot by 400-foot channel as discussed on page 4-16 of FEIS Supplement III. The USACE has attempted to maintain the present channel by dredging for over 40 years. Our actual experience has shown that hazardous navigation conditions exist frequently at Oregon Inlet that have resulted in vessel losses and damages, vessel relocations and delays, injuries to crews and occasional deaths.

Specific discussion of the actual dredging experience is contained within Appendix E of the GDM Supplement No. 2 along with a summary of other dredging alternatives considered in lieu of the jetty plan. Analysis of actual controlling depths in the inlet have shown that since 1983, a bar channel at or below 14 feet was attained only 24% of the time in spite of the concerted dredging costing over \$5 million per year over the period. Further, dredging cannot prevent major shifts in the channel that have occurred at the site or provide the benefit of wave sheltering, both of which are afforded by the jetties. In summary, the existing navigation maintenance efforts at Oregon Inlet do not provide for a safe navigable channel and therefore do not meet the basic project requirements that are provided by the preferred jetty plan.

The USACE did an analysis in 1984 to assess the adequacy of the authorized channel depth of 20 feet below mean low water through the ocean entrance. The primary focus of the analysis was whether the 20-foot channel was excessive given the fleet of commercial vessels that use Oregon Inlet. The analysis considered the various motions of a vessel as it plies through the inlet under a range of wave and tidal conditions expected at the site. In this regard, the channel depth must be able to accommodate the vessel draft, the vessel pitch (the amount of vertical motion in a wave environment), and the vessel squat (the vertical distance that a vessel lowers in the water while underway). Added to these variables is a minimum under-keel clearance needed to safely maintain the vessel steerage. The results show that for the typical design vessel having a length of 75 feet and draft of 11 feet, the 20-foot deep channel would fail to provide safe bottom clearance approximately 17% of the time over the course of a years' time. More specifically, during the commercial fishing season that typically extends from September to April, the monthly percentages of unsafe bottom clearances range from 15.6% to 25%, with a

season average of 21%. While these percentages indicate the time when wave and current conditions render the 20-foot depth inadequate, the actual probability of a vessel encountering such conditions would be somewhat less. For example, vessels would remain in port during times when ocean conditions would be unsafe such as during extended periods of heavy seas or under posted small craft and/or gale warnings. These stormy periods would correspond with a significant portion of the reported percentages of unsafe bottom clearance. In all, the analysis showed that the 20-ft channel is not over designed and the need for the 20-foot channel is justified given the type of commercial vessels that use Oregon Inlet.

The channel dimensions are needed based on existing vessels, which range from 55 to 105 feet in length and draw from 9 to 13 feet fully loaded. These are the vessels needed to fish productively in the ocean environment and compete in regional and national seafood markets. The USACE is no longer assigning any economic benefits from increased fish landings resulting from the project, as it believes that resource to be fully exploited. If vessels withdraw from the fleet, as a result of a nationwide overcapitalization described by NMFS, we would expect that smaller, less efficient vessels would withdraw, and larger, more efficient vessels would remain. The remaining vessels would still require the authorized channel dimensions, and would still benefit from improvements in fishing efficiency. Appendix C of GDM Supplement No. 2 has completely documented the vessels using Oregon Inlet and fishing efficiency benefits expected from the proposed jetty project.

Using the figures provided in the NOAA referral package, the jetty project would still be the recommended National Economic Development (NED) plan following the Water Resources Council’s Principles and Guidelines. The following table gives the NED analysis following these guidelines for the NOAA figures.

<u>Plan</u>	<u>Average Annual Costs</u>	<u>Average Annual Benefits</u>	<u>Net Benefits</u>	<u>Benefit/Cost Ratio</u>
<u>Maintenance of the 14-foot project</u>	\$6,949,000	\$17,986,000	\$11,037,000	2.6
<u>Jetty Alternative</u>	\$10,643,000	\$25,223,000	\$14,580,000	2.4
<u>Increase in Average Annual Net NED Benefits</u>			\$3,543,000	

We realize that NOAA would prefer an alternative which required only dredging. We have evaluated numerous “dredging only” alternatives in the past, but they do not show the potential to be the NED plan. Implementing the proposed jetty project produces

positive net benefits of \$3,543,000 using the NOAA figures, and is economically justified. The No Action Alternative of continuing maintenance dredging is also economically justified but produces less NED benefits than the jetty alternative.

The USACE has considered reliable data and scientific opinion on the preferred alternative with regard to sand transfer across the inlet as well as possible impacts to larval transport through the inlet. Major modifications have been made to the jetty alternative as a result of these opinions with regard to both issues. Sand management and erosional impacts of the jetties have always been the key project issues. As previously discussed, these issues were central to the DOI/COE task force. The result of this task force was the development of a comprehensive sand management plan that addressed many of the major concerns raised by experts outside of the USACE. This plan, contained in the 1995 Feature Design Memorandum on Sand Bypassing, included significant changes to the proposed plan as discussed above including; elimination of the controversial Sloping Float Breakwater, the frequency of proposed sand bypassing was increased from every other year to an annual occurrence, the area of sand management was doubled from 3 miles to 6 miles north and south of the inlet, the USACE agreed to assume the responsibility of erosion mitigation within this area *whether or not* the erosion was caused by the project or by natural means, and finally a comprehensive monitoring program was jointly developed to help identify project impacts and effectively manage the sand resources in the Oregon Inlet area.

Similar significant modifications have been made to the jetty plan with regard to facilitation of larval migration. As described in FEIS Supplement III, major design changes have been made to the jetties in response to concerns raised about this issue. These included the use of a weir in the north jetty as well as shortening both jetties by 1000 feet.

Given the above agreed upon changes made to the sand management plan and design changes made to the jetties, we believe the USACE has made a good faith effort to address the views and information contributed by outside experts concerning these issues. As such, the USACE maintains that the FEIS Supplement III is adequate as is and fulfills the NEPA requirements. We believe that the reasonably foreseeable impacts of the proposed project on beach erosion, barrier island overwash, estuarine habitats and biota, and larval fish have been adequately disclosed in the FEIS Supplement III (see Section 6). Scenarios that would cause disastrous impacts to such resources, such as not bypassing sand as needed, are not considered to be reasonably foreseeable. Congress has authorized sand bypassing as a part of the project and has the expectation that it will occur; therefore, we do not believe it is reasonable to consider a failure of Congressional support and commitment. Environmental mitigation and proposed monitoring are discussed in Section 3.04. Shoreline monitoring and erosion thresholds are discussed Section 3.02.11. Areas of uncertainty regarding potential project impacts are identified in Section 6.15 of the FEIS Supplement III.

2. Fish and Wildlife Coordination Act (FWCA), 16 U.S.C. 661 et seq.

NOAA Position: *The FWCA states that, "fish and wildlife conservation shall receive equal consideration and be coordinated with other features of water resources development programs . . .". 16 U.S.C. 661 The FWCA requires Federal agencies proposing to control or modify any water body to first consult with NMFS and FWS to conserve fish and wildlife resources by preventing damage to such resources and by providing for the improvement of such resources. 16 U.S.C. 662. The FWCA also authorizes agencies to modify water control projects to conserve wildlife resources as well as providing for development, and to submit to Congress an estimation of the wildlife benefits and losses that would be caused by a new project.*

NMFS has provided comments on the detailed FWCA report of the FWS and has provided numerous recommendations to the COE to conserve and protect marine and estuarine fish resources. In almost every instance, NMFS requested that the COE consider developing a "dredging only" alternative, and has consistently advised that the environmental consequences of the jetty alternative would be so adverse and severe that it would preclude our support for the project. With regard to planning, we have for the past ten years asked that the COE fairly and objectively evaluate alternatives that would be less damaging. We have cited numerous discrepancies in connection with design of the jetties and the type and magnitude of impacts that could result if they are built. In more specific terms, we have advised that the jetties, as a result of disruption of sand movement and transport of larval fish and invertebrates, could significantly diminish habitats and fishery resources that are of immense commercial, recreational, and ecological importance.

While the procedural requirements of the FWCA may have been met, the COE has done little else to implement the purposes of, or any tangible measures related to, the "equal consideration" provisions of the Act. Although the COE claims that the decision to add a weir section and shorten the length of the jetties were in response to NMFS concerns, we note that these changes do not address our concerns involving the effects of disrupting sand migration across the inlet, nor do they alleviate our concern over possible reduction in transport of larval fish and invertebrates through the inlet. As a matter of fact, these changes in the jetty design were categorically unacceptable to the COE until it was realized that, in their absence, the project would not be cost effective. As such, it is difficult to identify any significant effort on the part of the COE to equally consider fish and wildlife conservation in connection with project planning. It appears the COE's environmental consideration has been limited to that which fosters or does not get in the way of building jetties. Therefore, the COE has not meet the equal consideration requirement of the FWCA.

USACE Response: Consideration of project impacts on fish and wildlife has been central to the planning of this project and significant modifications are proposed that are intended to diminish or eliminate the environmental impacts of the project.

The intent and all procedural provisions of the FWCA have been met. A Final Fish and Wildlife Coordination Act Report has been received and is included as Appendix B to the

FEIS Supplement III. All recommendations in that report have been considered and addressed.

We believe that equal consideration of the environment has been an integral part of project planning since its inception. Indeed, the authorization for this project required sand bypassing as a part of the project plan. Sand bypassing was included as a part of this project plan because of equal consideration of the surrounding environment. The larval fish analyses, symposium, and workshop, all sponsored by the USACE, demonstrate a strong and continuing effort to give equal consideration to fish and wildlife conservation in connection with project planning.

The USACE would not compromise the design to purposely reduce costs to justify any project. The Federal objective of water and related land resources project planning is to contribute to national economic development consistent with protecting the Nation's environment. A plan that reasonably maximizes net national economic development benefits, consistent with that Federal objective, is to be formulated and identified as the NED plan. The USACE has in good faith been responsive to the many environmental issues raised by the various agencies and has considered all design changes with sound engineering judgment.

As fully discussed in section 3.4 of the GDM Supplement No. 2, consideration of the weir was done in response to request by the U.S. Fish and Wildlife Service to include low sills in the jetties (or other means) to allow larval fish to enter the inlet. In terms of sand management and control of sediment, the USACE still favors the use of impermeable structures. This is clearly stated in the July 1995, FDM on Sand Bypassing (Management). In the interest of accommodating the larval transport concerns, the use of the weir was revisited. Since more experience was available with the performance of weirs in the management of sediment versus the uncontrolled multiple low saddle sections, or other means, the weir concept was again recommended.

Likewise, the reduction in jetty length was based on a recommendation made by others (Mehta and Montague, 1991) as a means to reduce the travel time of the larvae around the ends of the structures. A detailed analysis was undertaken using state of the art modeling along with 10 years of beach surveys to better determine the minimum extent of the jetties without compromising the sediment control feature of the structures (Section 3.3 of GDM Supplement No. 2). Further, the adjustment of the ebb tide delta to the jetties was not fully accounted for in prior jetty designs. Together, the results lead to a moderate reduction in jetty length to better facilitate larval transport without loss of jetty function.

The USACE has a long record of giving equal consideration to the environment at Oregon Inlet. In addition to the larval fish and shellfish studies already mentioned, the USACE has provided over \$400,000 of monitoring money to the US Fish and Wildlife Service (Pea Island National Wildlife Refuge), over the past 10 years to monitor the impacts of sand placement from maintenance dredging of the existing channel on the fauna of the beach. These monitoring efforts are still ongoing and the information

obtained from it has been used in our analysis of sand bypassing impacts. The USACE also performs management of colonial nesting waterbirds on the dredged material disposal islands that line the navigation channel between the inlet and Wanchese Harbor, and funds biennial censusing of the colonial nesting waterbird populations in the area. The USACE has funded the state to construct oyster reefs in the area and has provided assistance and logistical support the NMFS for seagrass mapping in the area. It has also provided approximately \$100,000 to the US Fish and Wildlife Service for planning assistance in the area. Equal consideration of the environment has been integral to all USACE activities in the area.

In summation, we believe that NOAA is over-estimating the severity of project impacts if sand bypassing is performed. We are unaware of any location where fisheries have collapsed at other jettied inlets in the country, nor are we aware of any location where sand bypassing has produced long-lasting or profound impacts. We believe that our preparation of a Feature Design Memorandum on Sand Bypassing shows an equal consideration of the possible disruption of sand movement across the inlet and that the extensive record of reports and workshops on larval fish previously described, and the other studies that USACE has performed, show an equal consideration of environmental resources under the FWCA.

40 CFR 1504.3(c)(2)(iii) Present the reasons why the referring agency believes the matter is environmentally unsatisfactory.

NOAA Position: *Reasons for NOAA's determination that the preferred jetty alternative is environmentally unsatisfactory are presented in detail in other sections of this document. They are summarized here.*

- 1. Reasonably foreseeable significant adverse impacts involving larval fish movement through Oregon Inlet and into requisite rearing habitats exist with the preferred jetty alternative. Since the larvae would not be transported to these important habitats, they would suffer a higher mortality rate with the attendant decrease in fish stocks, including striped anchovy, bay anchovy, bluefish, American eel, Atlantic menhaden, weakfish, summer flounder, red drum, Spanish mackerel, and several shrimp species.*
- 2. Reasonably foreseeable significant adverse impacts involving beach erosion, barrier island overwash, and subsequent destruction of estuarine habitat exist with the preferred jetty alternative. This would cause a decrease in fish populations that depend on this essential habitat, such as various sharks, shrimp, Spanish mackerel, reef fish, bluefish, and summer flounder. Habitats affected include intertidal marsh, mud and sand flats; seagrass, coastal inlets, and the surf zone.*
- 3. A practicable and less damaging alternative exists, but was not properly evaluated by the COE. This lack of adequate consideration, and lack of choice of, a less damaging alternative will cause unacceptable environmental harm to fishery resources.*

4. *There is no assurance that mitigation needs can or will be identified, or that impacts can be offset. The COE's lack of consideration even of the need for mitigation, and therefore, lack of adequate mitigation, will cause unacceptable environmental impacts on fishery resources.*

USACE Response: USACE believes the proposed project avoids or appropriately mitigates for environmental impacts to significant resources that might arise from its construction, while providing a safe and reliable channel for navigation projects.

1) Potential project impacts to larval fish and shellfish have been studied and discussed at length in FEIS supplements II and III. We do not agree that significant impacts to this resource are reasonably foreseeable, as no demonstrated basis for this has ever been provided. There is certainly no basis in science or coastal engineering practice to conclude that larvae would not be transported into important estuarine habitats as stated by NOAA. Please see our response to first referral issue raised by NOAA ((40 CFR 1504.3(c)(2)(i)(1)). All analyses conducted to date indicate that, while uncertainty continues to exist, probable impacts are minor and significant impacts are unlikely.

2) Severe beach erosion, barrier island overwash and destruction of estuarine habitats could certainly occur with jetties alone. However, the USACE contends that through the implementation of the jointly developed an adaptive sand management plan, project induced erosion will not occur and thus adverse impacts resulting from such will not materialize. We have further determined that through the effective management of sediment with the jetty project, erosion will be less than has occurred historically as inlet induced sediment loss to the barrier islands will be eliminated. Please see our response to second referral issue raised by NOAA ((40 CFR 1504.3(c)(2)(i)(2)). With the proposed sand bypassing, we do not see a basis for a determination that these severe erosion impacts are reasonably foreseeable.

3) The USACE does not agree that it failed to evaluate a viable, less damaging alternative. As discussed above and within the FEIS Supplement III, our actual experience with maintaining the channel at Oregon Inlet has well documented our difficulties in achieving the present 14-foot channel. The persistent shoaling, major shifts in channel alignment, wave breaking over the ocean bar, and uncontrolled spit migration in the vicinity of the navigation span of the bridge will all continue under the without project condition. This plan therefore fails to provide a sufficiently safe and reliable channel that would be afforded by the preferred jetty plan. Please see our previous response and discussion of this issue ((40 CFR 1504.3(c)(2)(ii)(1)).

4) A mitigation plan to offset losses to estuarine habitats resulting from enlargement of Wanchese Harbor and expansion of disposal islands is already in place and is discussed in Section 3.04 of FEIS Supplement III. The District has proposed monitoring to disclose unquantifiable or trace impacts that are not readily foreseeable at this time. Should such impacts be identified, appropriate mitigation measures, if any, will be developed. Please see our previous discussion of this issue ((40 CFR 1504.3(c)(2)(i)(2)).

40 CFR 1504.3(c)(2)(iv) Contain a finding by the agency whether the issue raised is of national importance because of a threat to national environmental resources and policies or for some other reason.

NOAA Position: *NOAA has statutorily mandated stewardship and management responsibilities for the nation's living marine resources. In reviewing the environmental documents for the MSBP we have focused largely on possible impacts on aquatic habitats located within the project area. Based on our analysis of information provided by the COE and on input from a number of distinguished scientists and recognized authorities in the fields of coastal geology, coastal engineering, and marine biology, we believe that great environmental risk is involved with building jetties at Oregon Inlet. The most important areas and resources in jeopardy include estuarine tidal and intertidal lands and waters located behind adjacent barrier islands, and larvae and post-larvae of fish and invertebrates that must migrate through the inlet to reach maturation sites. It is important to note that a decision to not build jetties could eliminate the opportunity to generate about \$2.7 million in annual economic benefit; however, by building jetties, we face the risk of environmental losses of such magnitude that mitigation may not be possible. The losses will involve a significant decline in commercial and recreational fish stocks of national importance, as discussed below.*

The national importance of the issues raised is defined in terms of the value and importance of the resources that are at risk of elimination or degradation. The emergent wetlands, submerged aquatic vegetation beds, and shallow water habitats located landward of the barrier islands surrounding Oregon Inlet are among the most productive habitats in the world. Although estimates vary, in excess of 90 percent of the southeast region's commercially and recreationally important finfish and shellfish rely on these types of habitats for some aspect of their existence. The NMFS has identified 15 species found in Albemarle, Roanoke, and/or Pamlico Sounds that are species of national economic importance under the Water Resources Development Act of 1986. They contribute greatly to the economic and social welfare of North Carolina and the nation.

As mandated by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the South Atlantic and Mid-Atlantic Fishery Management Councils and NMFS, have identified areas of essential fish habitat (EFH) for species under their respective jurisdictions at and near Oregon Inlet. EFH, which would be impacted by the proposed jetty alternative of the MSBP, is defined in the Magnuson-Stevens Act as those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. For fisheries managed by the councils and NMFS, including various sharks, shrimp, coastal migratory pelagics (e.g., Spanish mackerel), reef fish, summer flounder, and bluefish, EFH includes intertidal marsh, seagrass, intertidal mud and sand flats, coastal inlets, surf zone, and other estuarine and marine habitats. Because of their extremely high environmental value and vulnerability to degradation, tidal inlets and seagrass also have been identified as Habitat Areas of Particular Concern (HAPC). The regulations implementing the Magnuson-Stevens Act specify that HAPC are subject to more stringent habitat conservation measures. The

designation of HAPC is a clear indication of the national importance of these habitats and fisheries.

Successful ocean to estuary migration of larvae and post-larvae of many near or offshore spawned fish and invertebrates is essential since maturation is not possible in the ocean environment. Oregon Inlet represents the single most important pathway for larval fish migration into Albemarle Sound and northern Pamlico Sound. Species involved include, but are not limited to, striped anchovy, bay anchovy, bluefish, American eel, Atlantic menhaden, weakfish, spot, pinfish, kingfish, pigfish, summer flounder, sea robins, red drum, Spanish mackerel, blue crab, brown shrimp, and white shrimp. Pamlico Sound is also the nation's most important nursery area for summer flounder and weakfish and any reduction in the ability of these fishes to reach essential developmental sites is likely to produce an eventual decline in abundance and production of these fish stocks.

Any reduction in the number of larvae that migrate through Oregon Inlet and into Albemarle Sound would not be offset by those entering from other inlets since the hydrological connection between Albemarle Sound and other inlets is only minor. Also, since Albemarle Sound is thought to be under-colonized by larvae it is unlikely that a reduction in the number of individuals entering the Sound by way of Oregon Inlet would lessen competition and thereby offset natural controls on productivity and abundance. Consequently, it is plausible that any reduction in larvae passed through Oregon Inlet would result in a comparable reduction in fishery production and harvest. This could also affect interstate recovery efforts for species such as striped bass, summer flounder, and weakfish which are recovering from historical overfishing.

USACE Response: While agreeing that the resources of the Oregon Inlet area are nationally significant, USACE does not concur with NOAA's assessment that the project poses a substantial risk of harm to those resources.

The USACE concurs with NOAA that the resources of the ocean, sounds, and National Seashore are of national significance, and that Oregon Inlet is the single most important pathway for larval fish and shellfish migration into Albemarle Sound and northern Pamlico Sound. We do not concur that the project presents a significant threat to intertidal lands behind the barrier islands or to larval or post-larval organisms. As mentioned previously, jetties without sand bypassing could cause significant erosion on down drift beaches and such impacts would be probable; however, with sand bypassing, the sediment budget will be kept intact and erosion beyond the background level that is naturally occurring should not take place. In addition, we do not believe there is evidence that would indicate a severe impact to migrating larval organisms would likely result from the project. We agree that these estuarine habitats are some of the most productive habitats known and are of great ecological and economic importance to the State of North Carolina, but we do not believe that any are at risk of elimination or serious degradation as a result of jetty construction with sand bypassing.

An Essential Fish Habitat analysis has been conducted and is included in the Final FEIS Supplement III in Section 6.06.4 (see page 6-17). The conclusion of this analysis is that

the proposed project will not have significant adverse impacts to Essential Fish Habitat or EFH species.

Finally, we agree that larvae entering from other inlets would not offset a reduction of larvae entering into Albemarle Sound through Oregon Inlet. However, based on all of the analyses performed, we cannot forecast such reductions in transit through Oregon Inlet.

40 CFR 1504.3(c)(2)(v) Review the steps taken by the referring agency to bring concerns to the attention of the lead agency at the earliest possible time.

By 1989, the preponderance of information showed that fish stocks had declined to the point where the project-related benefits projected by the COE involving additional fish landings could no longer be supported. NMFS conveyed this view to the COE in correspondence and at meetings held between 1991 and 1995. The matter was resolved when the COE accepted the NMFS's view that inlet stabilization would not result in increased fish landings. In 1989, the NMFS began closer examination of the role of inlets in the movement of larval and post-larval fish and invertebrates into estuaries. Evaluation of information from other inlets in North Carolina, as well as closer examination of data from Oregon Inlet, led to the determination that jetties could substantially affect the ingress of larval fish and invertebrates that rely on the inlet as a passageway to estuarine waters of Albemarle, Roanoke, and northern Pamlico Sounds. Beginning in 1991, and in subsequent correspondence and detailed comments on the Draft EIS for the MSBP, the NMFS consistently advised the COE that the jetties could cause enormous environmental harm and that a less damaging alternative should be sought.

The NMFS has also responded to information requests by the Office of Management and Budget (OMB) and the General Accounting Office (GAO). In connection with these efforts, NMFS advised that building jetties at Oregon Inlet could result in an unacceptable level of environmental harm and an alternative that relies on dredging only should be sought. These views were presented at a March 2000 meeting at OMB which was attended by representatives from COE Headquarters and from the CEQ. We are unaware of any subsequent action by OMB. The GAO is responding to information requests from Senators John Edwards of North Carolina and Max Baucus of Montana and we understand that the GAO will likely present its findings in March 2002.

USACE Response: There is a long history of cooperative investigation and analysis of issues raised by NOAA over a period of many years. We agree that NOAA has consistently raised concerns about the potential impacts of jetties at Oregon Inlet for a long period of time. This issue was first raised in NMFS comments on the draft EIS issued in 1977. We have continued our dialogue and coordination with the NMFS and agree that fish stocks have declined. We do not believe that inlet stabilization would result in increased fish landings.

We have been cooperating with the GAO on their audit of the project for several months and have been providing them with data and information as needed. We have not been provided any indication of what their audit findings will be on the project.

40 CFR 1504.3(c)(2)(vi) Give the referring agency’s recommendation as to what mitigation alternative, further study, or other course of action (including abandonment of the matter) are necessary to remedy the situation.

NOAA Position: *In recognition of the significant and unacceptable adverse environmental consequences of building jetties at Oregon Inlet, the COE should select the No Action Alternative. This alternative would allow continued dredging in the channel to maintain useable channel dimensions without causing unacceptable harm to fishery resources.*

In conclusion, NOAA is convinced that building jetties at Oregon Inlet poses a reasonably foreseeable likelihood of causing significant, long-term, irreversible impacts. Affected resources are nationally important fish and invertebrates, their habitats, and the people who rely on these resources for their livelihood and enjoyment. We are also convinced that mitigation for MSBP impacts may not be possible in view of the potential magnitude of impact, the complexity of measuring change in diverse and dynamic environments, and reliance on authorities and funding that are not available in connection with the MSBP, but must be obtained from other sources.

USACE Response: The project plan described in the FEIS Supplement III represents the most practical and feasible plan for providing a safe and reliable navigation channel at Oregon Inlet.

We disagree that the No Action Alternative will maintain useable channel dimensions. The full dimensions of the existing 14-foot deep by 400-foot wide channel through the ocean bar have historically been available to navigation interests only about 25% of the time. This marginal level of success has been in spite of a significant dredging effort of \$5,000,000 per year. Please see our previous response and discussion of this issue ((40 CFR 1504.3(c)(2)(ii)(1)). The Supplement No.2 GDM and FEIS Supplement III fully disclose impacts that could reasonably be anticipated to result from the project and that mitigation for project impacts is feasible. Accordingly, the USACE continues to believe that the project plan, as described in GDM Supplement No. 2 and FEIS Supplement III, represents the best solution to the navigation needs of the area.

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